

REMARKS

Claims 9-11 are pending in the present application, claim 10 having been withdrawn. The Office Action and cited references have been considered. Favorable reconsideration is respectfully requested.

Claims 9 and 11 were rejected under 35 U.S.C. §103 as being unpatentable over Alden (PCT Publication WO2004/041541) in view of Welschlau (U.S. Patent 4,587,898) as evidence by Spann (U.S. Patent 6,491,361) and further in view of Heaven et al. (U.S. Patent No. 5,658,432) and Panebianco (WO 2002/084008A2). This rejection is respectfully traversed for the following reasons, and for the reasons set forth in the response filed on December 4, 2007, which is hereby incorporated by reference.

Within the prior art cited by the Examiner only Welschlau discloses a machine for manufacturing corrugated paper. It must thus be considered to be the closest state of the art. The Examiner argues in the Advisory Action of December 24, 2007, that Alden is the primary reference, and Welschlau is not the reference being modified. That is true. Nevertheless, Applicant respectfully submits that Alden discloses a method for using an ink-jet printer to apply a graphic design pattern to a substantially plane workpiece (a corrugated board) and using a laser cutter to put cuts in the workpiece so that items with a two dimensional design are created, which are then assembled into a three-dimensional, self-locking and self-supporting construction. According to Alden, the workpiece 1, which is printed and cut into a predetermined shape, is made of corrugated board, "which is a laminate material comprising two substantially parallel covering layers of paper material and a core of corrugated fiber board placed between the covering layers, and at least one

diffusion layer". Page 3, lines 8-10. Thus, the corrugated board used by Alden is pre-fabricated. Printing and cutting a pre-fabricated corrugated board does not constitute manufacture of corrugated board. For the manufacture of corrugated board, several webs of material are needed, at least one of which is corrugated in a fluting unit and subsequently united with at least another web of material to form a web of corrugated board. Alden does not relate to any of these steps, and thus, does not disclose a machine for manufacturing corrugated paper. However, Welschlau does relate to a machine for making corrugated paper, and thus is believed to be of closer relevance than Alden. Nevertheless, Applicant respectfully submits that Welschlau and Alden are from diverse arts, and one of ordinary skill in the art would not have been motivated to combine their teachings.

Applicant notes that Welschlau does not address the problem of shrinkage and, accordingly, does not disclose anything about determining scaling factors for the printing patterns. In fact, as the machine disclosed by Welschlau uses a rotary printing machine (see column 1, line 15), the scaling of the printing pattern would, if at all, not easily be possible, since a rotary printing machine has to be provided with pre-fabricated printing forms. Consequently, continuously scaling the printing pattern in an in-line process is not possible with a rotary printing machine. Declaration of Norbert Städele, paragraph 5 (hereinafter "Städele, ¶ __").

In the Advisory Action, the Examiner indicated that Heaven et al. and Panebianco disclose determining shrinkage and compensating for it. Applicant's previous

response did not ignore these references – they were discussed, on pages 4-5 of the response. Further comments will be provided below.

Even more, since the rotary printing machine disclosed by Welschlau consists of several printing stations adjacent to each other and several printing stations in sequence, which must print one over the other (column 4, lines 14 et seq.) the problem to be solved by Welschlau is to adjust the printing stations such that the printed pictures can be printed upon the advancing paper web in proper relationship to one another and over one another (column 4, lines 33 to 37). This is accomplished by shifting of the carrier bands relative to one another. Col. 4, line 66 - col. 5, line 30. Clearly, this can only work in the absence of any shrinkage. If there was any shrinkage, the carrier bands with suitably scaled printing forms would also have to be continuously adjusted relative to each other along the direction of the width of the paper web to make printing the same picture several times in proper relationship to one another and over one another possible at all. Welschlau does not address this issue as he does not address the problem of shrinkage. Städele, ¶ 5. Accordingly, the disclosure by Welschlau does not lead a person skilled in the art to the invention according to claim 9.

Furthermore, Welschlau does not disclose the use of a digital printing method. Only with a digital printing method in accordance with the present invention is it possible to flexibly scale a printing pattern with scaling factors, which are determined depending on a continuously monitored, varying degree of shrinkage of the corrugated web being produced. With conventional, previously known printing methods, such as rotary printing, printing forms have to be pre-fabricated rendering a continuous, flexible scaling

impossible. In accord with the teachings with respect to conventional paper making machinery, Welschlau discloses the use of a rotary printing machine. Welschlau does not teach any reason why one should replace a rotary printing machine by a digital printer. Städele, ¶ 5.

The Advisory Action argues that “...the primary reference is Alden, which is a digital printer. Examiner does not have to determine a reason to replace the rotary printer of Welschlau with a digital printer, since the primary reference, Alden, is a digital printer. Welschlau is used to suggest making the product of Alden in a continuous process as shown by Welschlau.” Applicant respectfully submit that the Examiner does have to provide a reason as to why one of ordinary skill in the art would modify Alden to use the teaching of Welschlau, which uses a rotary printing machine. Further, making the product of Alden, even in a continuous process as shown in Welschlau, does not yield Applicant’s claimed invention, since as discussed above, Alden does not make a corrugated board – it makes a product *using* a corrugated board.

None of the other prior art cited by the Examiner discloses the determination of scaling factors for printing patterns. Städele, ¶ 6.

Applicant respectfully submits that Aldén does not use a heater, so there is no shrinkage involved. Spann relates to a digital media cutter that produces pieces of printed media of a pre-defined shape. Thus, Aldén and Spann do not address the issue of shrinkage and do not relate to a method of manufacturing corrugated board. Accordingly, they do not teach anything about determining and applying a scaling factor to a printing pattern to account for shrinkage. Städele, ¶ 6.

In the Advisory Action, the Examiner argues:

Regarding applicant's argument that none of the prior art discloses scaling factors for printing, Heaven et al. discloses how to determine scaling factors in general. Panebianco discloses determining the amount of shrinkage to determine the original size needed to have the correct size. Heaven et al. is directed to paper, indicating to one in the art that paper, and therefore corrugated faceboard, shrinks. Recognizing that the user would desire his product to be a specific size and that paper, and hence corrugated cardboard, shrinks, one in the art would be motivated to look to methods of how to determine the amount of shrinkage and account for it so that the final product is the size desired.

Applicant respectfully disagrees.

Heaven discloses a method for determining cross-machine shrinkage in papermaking machinery. Heaven uses the determined shrinkage profiles to allow for better shrinkage modeling within each grade of paper being produced. See, e.g., col. 4, lines 40-53. Heaven does not concern printing at all. Heaven teaches using "the shrinkage profile to account for variable shrinkage across the sheet when providing control signals to upstream actuators in response to downstream sheet property measurements. Once shrinkage profile measurements are made, the optical system can be reset to its normal function of locating sheet defects." Col. 4, lines 13-19. Consequently, Heaven does not disclose determining scaling factors so that the desired size of a printing pattern will appear on the web, as in the present invention. Furthermore, Heaven does not disclose anything about the determination of a shrinkage factor along the length of the sheet, because it does not need this information to measure defects in the sheets. It only measures along the cross-direction of the web. Städele, ¶ 6.

Heaven discloses an apparatus and method of determining sheet shrinkage in the context of papermaking machinery. However, Heaven does not disclose a corrugating

machine which comprises at least two unroll stands for unwinding continuous webs of material or processing equipment for producing at least one web of corrugated board from the webs of material. Thus, Heaven does not teach how to determine sheet shrinkage in a corrugating machine according to the present invention. Städele, ¶¶ 6-7.

Furthermore, since Heaven does not concern printing, determining scaling factors for the printing patterns or, indeed, replacing a conventionally used rotary printer by a digital printing method is not known from Heaven. Städele, ¶¶ 6-7. Thus, even a combination of Welschlau and Heaven would not lead to the use of a digital printing method instead of the rotary printing machine used by Welschlau.

Finally, cutting the sheets of corrugated board in accordance with the shape and size of digitally imprinted patterns is not known from Heaven. Städele, ¶¶ 6-7.

Panebianco does not concern a machine for manufacturing corrugated board or, indeed, printing at all. As a consequence he does not teach anything about applying a scaling factor to a printing pattern. Städele, ¶ 8.

Panebianco concerns the shrinkage of textiles during washing. Panebianco teaches how to measure fabric, wash it, and account for shrinkage by increasing the size of the fabric specification (page 7, lines 10-12), then, based on the users inputting of enlarged garment specifications into the device (page 11, lines 7-9), cutting more fabric so that the cut garment matches the original, pre-shrunk, size specified by the designer (page 8, lines 14-19). This is totally unrelated to the present invention. Panebianco does not concern a machine for manufacturing corrugated board or, indeed, printing at all. As a consequence he does not teach anything about applying a scaling factor to a printing pattern to be

printed on a sheet of corrugated board. As Panebianco does not disclose a method for the manufacture of sheets of corrugated board nor a corrugating machine nor any printing at all it cannot contribute anything to the solution of the above mentioned problem.

It is not clear how a method for determining shrinkage of cloth fabrics due to washing as disclosed by Panebianco could teach a person skilled in the art anything about the manufacture of imprinted sheets of corrugated board. The Office Action asserts that Panebianco discloses using the scaling factors so that the final article is the desired size. The way that Panebianco does this is by changing the size of the cutting instructions given to the machine so that the fabric cut-outs used to form the garment are larger, to account for the shrinkage expected during washing. There is no printing disclosed – Panebianco concerns only the cutting a fabric large enough to account for the shrinkage that occurs during washing and drying. If one of ordinary skill in the art were to follow the teachings of Panebianco, he would learn that to board to be the right size after drying, one increases the size of the board that is cut originally, before the drying process occurs. He would not have been taught to determine scaling factors to control printing patters so that the desired size of the printing patterns will appear on the web. Thus, Panebianco does not suggest that one should, nor could, provide a way that a person skilled in the art could modify Alden, Welschlau and Heaven to determine scaling factors so that the desired size of the printing patterns will appear on the web, as provided for in the present invention. Städele, ¶ 8.

The Advisory Action states “[Panebianco] is used to show that when an article shrinks, it is known to compensate for the amount of shrinkage by making the original larger so that when it shrinks it will be the desired size. The cutting of fabric so that

when it shrinks it is the desired size, suggests the printing so that when the material shrinks, it is of the desired size." However, that is not Applicant's claimed invention. Applicant does not alter the size of the web of material that is cut so that when it shrinks it will be the desired size. Applicant's claimed invention involves changing the size of the printed pattern to account for the fact that the corrugated board will shrink, so that the pattern, when applied to the board, is in the right place and of the right size. Thus, Applicant respectfully submits that Panebianco would not have led one of ordinary skill in the art to Applicant's claimed invention, in the absence of impermissible hindsight reasoning.

The Advisory Action suggests that Heaven and Panebianco are analogous art because they "are pertinent to applicant's problem, namely the determination of the amount of shrinkage and how to account for it and allows for the final product to be the desired size." This is a misstatement of Applicant's problem – Applicant's invention does not involve a change in the size of the cut corrugated board – it involves changing the size of the printed pattern, digitally printing the altered pattern on the web of material, and then cutting the printed web of material into the correct size and shape. As indicated on page 2 of the specification, "the gist of the invention resides in digitally imprinting the webs during manufacture of the corrugated board, even before the sheets are cut to size, in a corrugating machine." In accordance with Applicant's claimed invention, the digital printing of patterns on the web takes place after the scaling factors to account for shrinkage have been determined ("digitally printing the printing pattern . . . **in accordance with the determined scaling factors**"), and the sheets are cut thereafter from the printed

web of corrugated board ("cutting the sheets . . . *from the digitally printed web* . . . in accordance with the shape and size of the digitally imprinted patterns."). None of the cited art, whether taken alone or in combination, teaches a method of manufacturing corrugated board so that this feature is achieved.

In summary, not even a combination of all five documents of the prior art cited by the Examiner, would lead to the subject matter recited in claim 9. Thus, claim 9 is patentable over Aldén in view of Welschlaue as evidenced by Spann, and further in view of Heaven et al. and Panebianco.

In view of the above amendment and remarks, Applicant respectfully requests reconsideration and withdrawal of the outstanding rejections of record. Applicant submits that the application is in condition for allowance and early notice to the effect is most earnestly solicited.

If the Examiner has any questions, he is invited to contact the undersigned at 202-628-5197.

Respectfully submitted,

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